Name: CRYSTAL CHEMISTRY – Ug By Dr Opio Ken-0776162721

Signature	Stream

545/1

CHEMISTRY $\frac{X}{57}$ x100%

Paper 1

2 Hours

Uganda Certificate of Education

CHEMISTRY

Paper 1

2 Hours

INSTRUCTIONS:

This paper consists of two sections **A** and **B**. It has six examination items.

Section **A** has two compulsory items.

Section **B** has two parts, Part I and II. Answer **only one** item from each part. Answer four items in all.

Answer to section **A must** be written in the spaces provided while those of Section **B must** be written in the answer sheets provided. Any additional item(s) answered will not be scored.

SECTION A

Answer **both** items provided in this section in the spaces provided.

Item 1:

In one of the suburbs of Kampala capital city, residents have been complaining of stomach ache, increased cholera outbreak in the area due to bacterial invasion in the area. Many of the residents were admitted and diagnosed in one of the nearby Health centres for immediate treatment. From the Doctor's reports, most of the patients admitted at first, were using Aloe Vera juice for treatment, but it didn't work well and they were advised accordingly by the Doctors for proper medication. You have been tasks to advise the patients on proper medication they should use.

Task:

As a chemistry student.

a) Advice the residents on the possible mistake made while they chose the product(s) for used.

They chose traditional medicine other than modern medicine such as antibiotics ✓C	C = 02scores

b) Advise them on the role of the type of the product they needed to use.

Antibiotics work by inhibiting or preventing the microbial growth in the body ✓F_1 allowing the body's immune defense system to eliminate the infection permanently ✓F_1	F = 04scores C + F = M_2 M_2 = 06scores

c) Advise them on some of the challenges associated with the product use and possible measures taken.

They cause nausea, dizziness, fatigue and body allergic reactions. D(i) This is mitigated by taking plenty of fluids/water/having enough rest and taking the recommended dose. ✓D(m)	D_2 = 06scores.
TOTAL = M_2 + D_2 = (06+06) =	12scores

Item 2:

Mr. Nsereko wants to install a more reliable water – reservoir at his home, with intention of collecting rain – water. Much as he has little knowledge about the structural properties of materials including the wellbeing of the environment around him, still he could not make a better choice of the materials he would like to use at his home. You have been approached to make guidance.

Task:

As a Chemistry student:

a) Explain the categories of the materials.

The metallic water tank is an alloy of stainless steel; C(i) because it is made up of uniform metals such as iron, chromium, nickel and carbon C(r)	C(i) + C(r) = C_2 C_2= 04scores.
Alternative response: The plastic water tank is a synthetic polymer; because it's man made material. Example may include plastic materials.	

b) Advise him on the suitability of the materials.

Stainless steel: -has high tensile strength P1 -resistant to corrosion P1 -are malleable P1 -are water proof -has high melting point	**Synthetic polymer:** -has high tensile strength P1 -resistant to corrosion -are water proof P1+ P1+P1+P1 = P_4 = 04scores
Stainless steel is malleable, water proof with high tensile strength, thus can be used to make water reservoir U_1 U_1= 01score	**Alternative response:** Synthetic polymer such as plastics is resistant to corrosion and are water proof, thus can be used to keep water.

c) Advise him on the danger associated with the materials to the environment.

Stainless steel materials are non – biodegradable materials D(i) and can pollute both soil and water when they rust hence altering their pH D(e) This is mitigated by encouraging re-using or recycling of metal materials D(m)	D(i) +D(e)+ D(m) = D_2 D_2 = 03scores.
TOTAL = C_2 + P_4 + U_1 + D_2 = (04+04+01+03) =	12scores

SECTION B (PART I)

Contains only **one compulsory** item. Write the answer to this item in the answer sheets provided.

Item 3:

Due to high demand of synthetic paints using Sulphuric acid in the Country, has made the government to allow some of the local investors to set up a production plant for Sulphuric acid in Kilembe mining sites in Kasese District. However, they have been cautioned to be environmental conscious as the production proceeds in the areas. The locals however, also worried whether this will also bring new development in the area at large.

Raw materials and process of production of Sulphuric acid	Sulphuric acid is obtained on large scale by Contact process ✓ Cp when sulphur in copper pyrites ✓ Rm burns in air ✓ Rm to form sulphur dioxide gas; followed by combustion of sulphur dioxide in air ✓ Rm in the presence of vanadium (V) oxide at 450°C and 200 atm to form sulphur trioxide gas in a sealed tank ✓ V $S(s) + O_2(g) \longrightarrow SO_2(g)$ $SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$ The gaseous product formed is pumped at a high pressure into a sealed tank ✓ V containing pure concentrated Sulphuric acid to form oleum. Oleum is dissolved in water ✓ Cd to form Sulphuric acid, purified ✓ Pr and packed for use. $SO_3(g) + H_2SO_4(L) \longrightarrow H_2S_2O_7(L)$

	$H_2S_2O_7(L) + H_2O(l) \longrightarrow 2H_2SO_4(L)$ (3Rm + 1V+ 3Pp + 3Ch+ 1Cd+ 1Pr) = P_3 = 06scores
Side effect and mitigation	Air pollution from sulphur dioxide gas; ✓ D(i) this lowers air quality, causes formation of acid rain that corrodes buildings, tree leaves and changes soil pH ✓ D(e) This can be mitigated by installing an electrostatic precipitator to absorb sulphur dioxide gas ✓ D(m) **Alternative response:** Prolong exposure to Sulphuric acid fumes ✓ causes potential risk to respiratory diseases, skin and eye irritations to workers since the acid is very corrosive and poisonous ✓ This is mitigated putting on personal protective equipment ✓ D(i) + D(e) + D(m) = D_3 = 06scores
Social benefit	Employment opportunity to the workers; ✓ S(b) hence improved their income earning ✓ S(e) and standard of living ✓ S(i) S(b) + S(e) + S(i) = S_3 = 06scores **Alternative response** Source of government revenue through taxation; ✓ hence improved infrastructure development such as roads, schools and hospitals in the area; hence ✓ improved standard of living of the people in the area ✓ TOTAL = P_3 + D_3 + S_3 = (06 +06+06) = 18Scores

PART II

Contains only **one compulsory** item. Write the answer to this item in the answer sheets provided.

Item 4:

Due to increased human population in Nakasongola District, most of the natural forests and water bodies in the areas have destroyed with intention of creating space, making charcoal and fire woods among many more. This attracted the attention of the environmental management authority to intervene the matter.

As a result the National Environmental Management Authority (NEMA) is organizing a radio talk show to create awareness to the people and surrounding neighbor hoods, about the dangers of these human activities.

As a Chemistry student, prepare a write message that will be used during the talk show upon invisitation.

Category and composition of Natural resources	Forests, air and water are Renewable Natural resources; C(i) Since they are infinite resources and can be replenished naturally within man's life – time. C(r) Air is a mixture of gases such as oxygen, carbon dioxide, nitrogen gas, and water vapour. Co_1 Water is a compound of hydrogen and oxygen. Co_1 Forests contain different tree species made up of carbon, hydrogen, oxygen. Co_1 Charcoal is composed purely of carbon element. Co_1 1C(i) + 1C(r) + 3Co = N_2 = 06scores
Danger of human's activities on N.R	Activities of man such as cutting down trees for timbers, making charcoal, bush burning, dumping of plastic wastes in water and soil, pouring untreated waste effluent from industries; D(i) affect the natural resources such as air, water and soil hence pollution, increased global warming and climatic change in the areas. D(e) This can be mitigated by encouraging community team spirit through tree planting

	that takes shorter time to grow, treating the industrial effluent before discharging them into the water bodies and recycling most of the non – biodegradable plastic wastes. D(m) Type equation here. D(i) + D(e) + D(m) = D_3 = 06scores
Social benefit	Air contains oxygen gas which is a raw material during cellular respiration by animals to generate energy. B(i). thus supporting life and normal body functioning. B(e) **Alternative response:** Air contains carbon dioxide gas, a raw material during photosynthesis by green plants and algae to make their own food to support life in an ecosystem. This supports the energy flow in a food chain. **Alternative response:** Forests are habitats, hence supports biodiversity of wildlife species and tree species. This facilitates conservation of natural resources and terrestrial wildlife habitats. **Alternative response:** Water is a source of hydro – electric power; tapped from the moving turbines to run home and commercial facilities; thus stimulating economic growth of the Country. **Alternative response:** Water is habitat for many aquatic wildlife, hence supports biodiversity of wildlife species and aquatic tree species. This facilitates conservation of natural resources and aquatic wildlife habitats. B(i) + B(e) = B_2 = 05scores
TOTAL = N_2 + D_3 + B_2 = (06 + 04 + 05) = 15Scores	

END